Amendments to the Claims:

This listing of the claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) An ultrasonic elastography system comprising:

<u>a graphic display;</u>

an ultrasonic acquisition assembly adapted to provide a set of ultrasonic signals from a plurality of voxels in a region of interest at a plurality of angles through the voxels, the set of ultrasonic signals including a first subset of ultrasonic signals taken with tissue of the region of interest in a first axial compressive state and a corresponding second subset of ultrasonic signals taken with tissue of the region of interest in a second axial compressive state; and

a processor receiving the set of ultrasonic signals and executing a stored program to:

(i) measure the displacement of each voxel projected along the angle of each of the ultrasonic signals between the first and second compressive states; ~~and~~

(ii) analyze the measured displacements at multiple angles for each voxel to determine a displacement for the voxel along a predetermined angle; <u>and</u>

<u>(iii) display a graphic representation of the elasticity of the tissue based on displacement of the voxel along the predetermined angle</u>.

2. (Original) The ultrasonic elastography system of claim 1 wherein the electronic computer analyzes the measured displacements at multiple angles for each voxel to determine an axial and orthogonal displacement for the voxel.

3. (Original) The ultrasonic elastography system of claim 2 wherein the analysis of the displacement estimates axial and orthogonal displacements by fitting a model to the measured displacements, the model relating projected angular displacement to axial and orthogonal displacement.

4. (Original) The ultrasonic elastography system of claim 2 wherein the processor further executes the stored program to determine parameters for the voxels related to the determined axial and orthogonal displacements.

5. (Original) The ultrasonic elastography system of claim 2 wherein the determined parameters are axial and orthogonal strains.

6. (Original) The ultrasonic elastography system of claim 4 wherein a parameter related to the determined axial and orthogonal displacements is Poisson's ratio.

7. (Original) The ultrasonic elastography system of claim 4 wherein a parameter related to the determined axial and orthogonal displacements is shear strain.

8. (Original) The ultrasonic elastography system of claim 2 wherein the orthogonal displacement is selected from at least one of the group consisting of: lateral displacement and elevational displacement.

9. (Original) The ultrasonic elastography system of claim 3 wherein the model does not presuppose material properties of the voxels.

10. (Original) The ultrasonic elastography system of claim 3 wherein the model provides a geometric decomposition of displacement measured along angles into projections along axial and orthogonal axes.

11. (Original) The ultrasonic elastography system of claim 3 wherein the model is:

$$p_\theta = d_z \cos\theta + d_x \sin\theta$$

where:

p_θ is a model predicted projection of the displacement along the angle of the ultrasonic signal:

d_z and d_x are axial and orthogonal displacements, respectively, producing the projected displacement;

wherein the fitting process matches the model predicted projections to measure displacements q_θ for each angle of measurement θ.

12. (Original) The ultrasonic elastography system of claim 11 wherein the fitting process is a least squares fit solving the following equation:

$$\bar{d} = \left(A^T A\right)^{-1} A^T \bar{q}$$

where:

$\bar{d}$ is the displacement vector $\begin{bmatrix} d_z \\ d_x \end{bmatrix}$;

$\bar{q}$ is the set of measured projections of displacement $\begin{bmatrix} q_{\theta_1} \\ q_{\theta_2} \\ \vdots \\ q_{\theta_m} \end{bmatrix}$; and

$$A = \begin{bmatrix} cos\,\theta_1 & sin\,\theta_1 \\ cos\,\theta_2 & sin\,\theta_2 \\ \vdots & \vdots \\ cos\,\theta_m & sin\,\theta_m \end{bmatrix}$$

13. (Original) The ultrasonic elastography system of claim 1 wherein one compressive state is no compression.

14. (Original) The ultrasonic elastography method of claim 1 wherein both the first and second compressive states are states of absolute compression.

15. (Original) The ultrasonic elastography system of claim 1 wherein the plurality of angles of ultrasonic signals are in multiple perpendicular planes.

16. (Original) The ultrasonic elastography system of claim 1 wherein the ultrasonic acquisition assembly includes a transducer selected from the group consisting of: a single transducer element moved in location and angle, a multi-

element transducer moved in location and angle, and a phased array transducer sweeping in angle and moved in location, and a multielement transducer with beam-steering.

17. (Original) The ultrasonic elastography system of claim 2 further including a display device and wherein the processor provides an image output based on the determined axial and orthogonal displacements.

18. (Original) The ultrasonic elastography system of claim 17 wherein the image output is selected from a group of: images of axial and lateral strain, images of voxel Poisson's ratio, and images of shear strain.

19. (Currently Amended) A method of ultrasonic elastography of tissue comprising the steps of:

(a) acquiring a set of ultrasonic signals from a plurality of voxels in a region of interest of the tissue at a plurality of angles through the voxels, the set of ultrasonic signals including a first subset of ultrasonic signals taken with the tissue of the region of interest in a first axial compressive state and a corresponding second subset of ultrasonic signals taken with tissue of the region of interest in a second axial compressive state;

(b) measuring the displacement of each voxel projected along the angle of each of the ultrasonic signals between the first and second compressive states;

(c) fitting a model providing projected displacement as a function of ultrasonic signal angle and axial and orthogonal displacement to the measured displacements; ~~and~~

(d) determining axial and orthogonal displacement for the voxels from the fit model; and

(e) displaying elasticity of the tissue based on the determined axial and orthogonal displacement.

20. (Original) The ultrasonic elastography method of claim 19 including the further step of determining parameters for the voxels related to the determined axial and orthogonal displacement.

21. (Original) The ultrasonic elastography method of claim 20 wherein a parameter related to the determined axial and orthogonal displacement is Poisson's ratio.

22. (Original) The ultrasonic elastography method of claim 20 wherein a parameter related to the determined axial and orthogonal displacement is shear strain.

23. (Original) The ultrasonic elastography method of claim 19 wherein the orthogonal displacement is selected from at least one of the group consisting of: lateral displacement and elevational displacement.

24. (Original) The ultrasonic elastography method of claim 19 wherein the model does not presuppose material properties of the voxels.

25. (Original) The ultrasonic elastography method of claim 19 wherein the model provides a geometric decomposition of displacement measured along angles into projections along axial and orthogonal axes.

26. (Original) The ultrasonic elastography method of claim 19 wherein the model is:

$$p_\theta = d_z \cos\theta + d_x \sin\theta$$

where:

p_θ is a model predicted projection of the displacement along the angle of the ultrasonic signal;

d_z and d_x are axial and orthogonal displacements, respectively, producing the projected displacement;

wherein the fitting process matches the model predicted projections to measure displacements q_θ for each angle of measurement θ.

27. (Original) The ultrasonic elastography method of claim 26 wherein the fitting process is a least squares fit solving the following equation:

$$\bar{d} = \left(A^T A\right)^{-1} A^T \bar{q}$$

where:

$\bar{d}$ is the displacement vector $\begin{bmatrix} d_z \\ d_x \end{bmatrix}$;

$\bar{q}$ is the set of measured projections of displacement $\begin{bmatrix} q_{\theta_1} \\ q_{\theta_2} \\ \vdots \\ q_{\theta_m} \end{bmatrix}$; and

$$A = \begin{bmatrix} \cos\theta_1 & \sin\theta_1 \\ \cos\theta_2 & \sin\theta_2 \\ \vdots & \vdots \\ \cos\theta_m & \sin\theta_m \end{bmatrix}$$

28. (Original) The ultrasonic elastography method of claim 19 wherein one compressive state is no compression.

29. (Original) The ultrasonic elastography method of claim 19 wherein both the first and second compressive states are states of absolute compression.

30. (Original) The ultrasonic elastography method of claim 19 wherein the plurality of angles of ultrasonic signals are in multiple perpendicular planes.

31. (Original) The ultrasonic elastography method of claim 19 including the step of providing an image output based on the determined axial and orthogonal displacements.

32. (Original) The ultrasonic elastography method of claim 19 wherein the image output is selected from a group of: images of axial, lateral and elevational strain, images of voxel Poisson's ratio, and images of shear strain.